

## The Story of

# SOVIET ARMOR

by GARRETT UNDERHILL

First in a series of three articles on Soviet Armor, covering the "Early Days," the "Middle Ages" (the 1930's), and the War Years—a significant evaluation of background on one of the Big Three armor-producing nations of the World.

IT IS an unalterable historical fact that Russia is to be credited with the invention of the tank."

This astonishing statement keynoted a 1947 Soviet summary of armor development. Strange as it may seem, no better keynote could be found for any Western study of the story of Soviet armor. For these words speak volumes. They not only further the postwar Red policy which seeks to instill a feeling of "Soviet patriotism"—and which therefore credits the Russians for important developments which antedated the Soviet regime. They betray the fact that the growth of the Soviet armored arm has been influenced by many factors besides strictly military and technical ones. They hint at the existence of national, group, and personal inferiority complexes—complexes arising from the relative positions of Russia and the West in the fields of industrial accomplishment, and till lately in the field of military accomplishment. The student of history can detect in these few words a strong scent of personality clashes, of pride, prejudice, patriotism, and politics.

The statement—diametrically opposed to a view taken only a year earlier in the official *Journal of Tank and Mechanized Troops*—is in itself an example of the Soviets' ability completely to reverse their views almost overnight; and to do so without having to furnish rhyme or reason. The fact that the Soviets consider it necessary to claim credit for the tank is important; it is a sign of the emphasis they have always put upon psychological factors affecting fighting spirit—and the design of their combat equipment. The narrowness of the "party line" the sentence expresses indicates the limitations under which Soviet engineers, technicians, and soldiers must work; it suggests the extra pitfalls which make forward-looking soldiers' and engineers' ordinarily difficult paths, even more hazardous. The finality of the word "unalterable" conveys a sense of the dread compulsion which has so often "inspired" Soviet soldiers and engineers to achieve the impossible. Indeed, the statement is a sample of that successful

Soviet policy of dangling a carrot in front, and snapping a whip in the rear—a policy which in strictly military matters has taken the form of daring leadership and absolute compulsion.

Remarkable as it may seem, the Soviets have somewhat of a case to back their claim of being first with a practical tank. In August, 1914, a master machinist in a Riga factory proposed a track-laying armored combat vehicle. It was built and tested in June, 1915. Since the British "Little Willie" (forerunner of the first British service tank) wasn't tested till September of that year, and since France's first Estienne tank wasn't then built, there is something in the argument that the Russians had the first working model of what came to be the common-or-garden tank.

This Russian "tank" was a strange affair. As built it was a fast but tiny, one-man bug-like vehicle. The upper part of the suspension was housed in the hull. Like the later U.S. Christie tanks, this Porokhovshchikov job had tracks that could be removed, permitting the tank to travel on wheels on roads for higher speeds.

In the test model that was completed, the driver sat with the upper part of his body exposed. Although information so far available furnishes no sure clue, it is possible that the test model was a scaled-down version of a tank big enough to house a crew. It is known that the test model was improved and, by waterproofing, made into the first amphibious tank.

Porokhovshchikov got this far and no further with his tank. It was, the Reds tell us, turned down by a "servile War Ministry"—an organization they hold to have been too prone to deprecate Russian ideas, and too ready to accept foreigners' proposals. Mr. P's only consolation was that his clutch design was later used on the Soviet-made copies of the Renault tank.

In view of Porokhovshchikov's name, it is perhaps just as well that it was General Swinton who really put across the tank. With such a handle as his, Mr. P could hardly have expected to have his name ring throughout the Western World, no matter what he did.

Among the other proposals for a tank in Czarist Russia was a Captain Lebedenko's. A Martian trieyele-

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like contraption with two giant spoked wheels 82 feet in diameter, and a small steam roller in the rear, this Army officer's "tank" had a girder-like frame topped by a turret. Although the precise purpose for which it was designed is not stated, obviously it would have been highly vulnerable.

Lebedenko sold his "tank" direct to the Czar. With a wooden model, he demonstrated on the Czar's desk how the vehicle would climb obstacles—which in this case were the big volumes of the *Laws of the Russian Empire*. The project was approved and a full-scale version readied by August, 1915. At the outset of the tests, the "tank" ran into a big birch tree, knocked it down, but bogged down in the ground. The Soviets say that the skeptical War Ministry used this incident as an excuse to abandon the project forthwith.

Interestingly—in view of the Soviet tank industry's later connection with the aircraft industry—Professor Zhukovski ("Father of Russian Aviation"), and A. A. Mikulin (now a prominent designer of liquid-cooled airplane engines) were associated with this tank proposal.

It would appear that Mr. P deserves much credit for his work. He wasn't travelling in such distinguished company as Lebedenko. It must be remembered, too, that Russia had none of the Holt caterpillar tractors which, as prime movers for British heavy artillery, had inspired Generals Swinton and Estienne.

Though they are proud of Mr. P, the Soviets cannot adduce any such evidence of Russian forethought as remarkable as the 1911 tank proposal by Austria's Burstyn. Nevertheless, they challenge by implication this officer's place in history. They say that a man by the name of V. Mendelev that same year had a plan for what they call a tank. They do not adduce any such positive evidence as Burstyn's remarkable German patent (No. 252,815, of 1912—taken out after he'd gotten the run-around from the Austrian War Ministry). Anyway, an effort to match Burstyn just on the 1911 date is in essence hollow. Burstyn (a technician rather than a combat officer) first had his idea back in 1903, as the result of a destroyer joy-ride while he was chief of a telegraph station at Austria's Pola naval base.

The Russians, even by Soviet claims, were slow on the basic development which underlay the successful tank concepts of World War I. According to the record, no Russian tried a caterpillar tractor until 1880. Then Fedor Abramovitch Blinov built a steam-powered job not heretofore recognized by Western literature. There is no evidence to indicate whether he conceived his tractor independently, or whether he knew of previous work by Cowan and others in Europe. Anyhow, nothing came of Blinov's tracked tractor, either. The world had to await Benjamin Holt of California.

Significantly, the Soviets are as silent as the tomb about the early work of Kegresse. A mechanic in Czarist Russia, he became manager of the Czar's garage in Petrograd in World War I; when the Revolu-

tion came, he fled to France. In 1910 Kegresse took the Holt idea, and turned it into a flexible rubber-half-track. He added fabric to strengthen the rubber, and lugs to take the drive mechanism.

Originally Kegresse was not concerned with creating a cross-country vehicle. It was the poor roads and the snow that bothered him—the snow and mud that have always been on the minds of Soviet tank engineers. The war caused Kegresse to consider military applications of his half-track. In 1915 he brought forth his first model, which resulted in a 1916 order of 300 half-track assemblies for installation on armored cars. Some were completed by the Reds. They were installed on British Austin and Italian Fiat chassis, armored in Russia by the big Putilov plant. Meanwhile Mr. K had lit out for France, where his work with Citroen (France's Ford) brought forth a line of half-tracks, and led directly to the familiar U.S. half-track line.

As their interest in half-tracks indicates, the Russian

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Garrett Underhill

Imperial Army was an early bird so far as recognition of the armored car goes. As early as 1900 the artillery bureau (in Russia the artillery arm has always done an ordnance job of design and manufacture, and still handles small arms as well as artillery) worked on a steam-powered armored car. Designed by an engineer named Lutski, this Dvinsk car was underpowered and too heavy. But interest in armored cars continued, although the Imperial Army wasn't very alive to the possibilities.

During the Russo-Japanese War of 1904-5 the Russians ordered 36 of the French Charron armored cars. They accepted only one, though such vehicles would have been most valuable in suppressing the type of civil disturbance of which the 1905 Revolution was a forerunner. (The Reds later set great store by armored cars, and made every effort to win them over in order to put across the 1917 Revolution.)

Russia built its first homemade car in 1913, at the Russo-Balt factory. It formed its Automobile Corps at the outbreak of war, but worked mostly with imported

cars, and especially with foreign truck and passenger car chassis armed and armored in Russia. One American observer found that this armoring was strictly a scratch job; an Austin armored by the famous Putilov Plant had such poorly made joints in its armor that five of its crew were quickly massacred, once the car got into action.

Those who have previously heard the story of Russian armored cars will wonder how it is that other information on early Russian and Soviet armor development hasn't been made public before this. The fact seems to be that this information has lain shrouded by an "Iron Curtain" to no small extent created by Western indifference to the exploitation of available information on military subjects (on the part of some), and inability to do such work (on the part of others). Ignorance of the Russian language, and of how to locate the right Russian sources (and of how to exploit them), is no doubt to a large extent responsible for this state of affairs. It is by no means a new condition. It was one highlighted by Winston Churchill when he took as the title for his World War I Eastern Front history the words: *The Unknown War*.

To those familiar with the details of Russian military and armament history, there is nothing very surprising in the fact that the Russians were working on a tank idea concurrently with, and independently of, the British and French projects. Although the Imperial Army could hardly be described as a live, progressive organization in which every soldier and civilian stood on his merit alone, the fact is that members of the Army often displayed that capability for very original (if not actually wild) thought which often causes the label "mad" to be applied to a Russian. There can be no doubt that in spite of aristocratic and bureaucratic top-hamper, the old Imperial Army's and Navy's soldiers, sailors, arsenal engineers, and master mechanics set up a pretty good record for pioneer work.

It is important for Americans—who are prone to think the Soviets industrial upstarts, like the Japs—to know that the Russians were making artillery before Columbus discovered America; and that Tula Armory (founded in 1589) was expanded into a great small-arms factory in the early 1700's. Imperial Russia's trouble was not that she didn't have age-old establishments to produce military essentials like artillery and small arms. It was that this effort remained primarily a government one. Though it shifted to civil control during the 19th Century, throughout the 1700's the Urals mines, factories, and workers were literally the property of the chief of artillery. Until a comparatively late date Russia lacked the vigorous capitalist enterprises which brought such rapid industrial progress to the West in the 19th Century. The independence and expansion of what private enterprises there were, were hampered by government regulation, and by graft and monopoly possibilities. Industrial flexibility—both for rapid emergency expansion, and for the



THE AUSTIN-KEGRESS — 1918  
Bearing the motto "All Power to the Soviets," and the name Ukrainets.

production of new weapons—was therefore limited; an important conditioning factor in the growth of any new development like armor.

Few realize the smart work often done by the officers, men, and civilians connected with these government establishments, and even by people in the War Ministry. The first practical machine gun—the Gatling—was purchased by the Russians in quantity from Colt's Hartford plant after the U.S. Civil War. While U.S. and European armies remained indifferent to it, it played a role in Imperial Russian expansion into Central Asia, similar to that played by the Winchester rifle and the Colt revolver in the winning of the U.S. West. The Imperial Army was also the first to give real emphasis to the Maxim machine gun—the weapon with which the Germans revolutionized warfare in World War I. In 1902 the Russians adopted for their cavalry the light, air-cooled Danish Madsen machine gun. Had they figured out the right tactics and technique and T/O for it, its introduction could conceivably have prevented the development of the trench warfare conditions which made necessary the tank.

Imperial Russia also had ideas in artillery. The Putilov 76mm of 1900 (later the M1902) anticipated the needs of warfare far better than the famous French Model 1897 "75." The design, construction, and Crimean War performance of Russia's Kropstadt coast forts greatly impressed American observers, who considered them the best of the day.

While the Soviets seem much upset that the Imperial Army didn't actually put tanks into service, and failed to take up the caterpillar tractor, there were good reasons why the Czarist ministry did not. In Blinov's day the artillery arm hadn't gotten around to the design and manufacture of any very heavy, really modern pieces. Horses and manpower were plentiful; tractors weren't yet needed for draft.

When Mr. P and Captain Lebedenko came up with their tank ideas, the War Ministry was failing abysmally to produce such basic essentials as rifles, auto-

matic weapons, and artillery. So long as the troops were in a mood to cheer each fresh wagonload of artillery ammunition (often scarcer than hens' teeth), it was hardly time to think of trying to build tanks. And while it might be true that armored motor gun carriages could have multiplied the effectiveness of existing artillery through increased mobility, the problem of procurement of the carriage would have been more than a headache—as the reader will discover.

Of course it is true, as the Soviets charge, that as the 19th Century merged into the 20th, the War Ministry tended to favor foreign ideas and weapons. Especially in the 20th Century, it liked to buy its munitions abroad. The reason was simple. Committees, officials, and inspectors got free junkets, entertainment by foreign firms, and (in more than a few cases) outright graft. Fortunately for early Soviet efforts at tank building, the Imperial Navy patriotically travelled in exactly the opposite direction. It sought to build up Russian facilities, though it tended to discourage private enterprise, and keep facilities within the Admiralty empire.

Obviously, the blame for not making the most of subordinates' pioneering efforts cannot all be laid on the doorstep of the War Ministry. Not a few of the innovations came to nothing because technology hadn't yet made possible a successful working model. For instance, armored vehicles had to await a good internal combustion engine; hence the failure of the Dvinsk steam car.

A more important reason for the failure of pioneering efforts was the Imperial Army's tendency to adopt developments before it had worked out practical tactics and technique. The stillborn attempt to introduce the Maxim and Madsen machine guns—a failure due entirely to misuse—might even be said to be characteristically Russian, for it will be noticed that the Soviets have displayed a similar tendency to be foresighted on weapons, and shortsighted on the tactics they must employ. Indeed, the tremendous Soviet tank program of the 1930's, and the effectiveness of what then were the world's foremost designs, as late as 1941 were

badly compromised by the lack of proper armored organization and tactics.

The Russian predilection for the new and novel was fully unleashed when the Soviets came to power. The professional Russian soldiers, the "military academicians" (service school professors), and the various engineers all got an opportunity to sell new ideas. (Contrary to the belief of many Westerners, the Red Army took over the civilian and most of the officer cadres of the Imperial Army.) Many engineers no doubt stayed with the new regime because the restraint of the previous one had chafed them; their sense of inferiority in the face of Western progress had made them patriotic. They wanted a chance to show their ability, and felt that the new regime would provide it.

At first, however, their ambitions were strictly circumscribed by the immediate and urgent needs of the Revolution of 1917 and Civil Wars of 1918-1921. The open nature of these conflicts, and especially the lack of artillery and shell-firing heavy weapons, generally favored the wide employment of armored cars. This was a great era for weapons which could dominate supply routes, because the extreme fluidity of the wars restricted them largely to the axes of these routes.

The Imperial Army had made some use of armored cars, even as fire support vehicles in assault upon field fortifications. The Reds not only used them in mobile warfare, but on more than one occasion duplicated these strange and (to the Westerner) foolhardy tactics. The Reds made every effort to convert available trucks and cars to armored vehicles, and made considerable use of the resultant improvisations. Some conversions were thorough jobs undertaken by the various steel plants and heavy-duty machine shops. Prominent among the latter were the railway construction and repair plants. But many improvisations amounted to little more than mounting a rough boiler-plate box on a truck, with sides high enough to protect men lying prone. The effectiveness of such vehicles may be held in question, but it is well to recall that among the developments which proved most useful in that type of fighting was the Tachanka—a fast horse-drawn wooden cart, from which a machine gun could be fired with the draft team at the gallop. If the Tachanka was a great military asset, there wasn't much call for 6-mile-an-hour tanks.

In the unusual conditions of the Civil Wars, armored trains were of much greater military importance than tanks and armored cars. They were in effect the contemporary equivalent of self-propelled artillery. Not only that: they had integral "armored infantry, which detrained in assault." With far more mobility than any other armored vehicles then extant, the trains were considered most valuable for patrol, railway security, and fire support in assault and defense of positions along railways. Around 300 were used in the Ukraine and the Caucasus alone.

The Czarist Russians had no tanks, although they



The T-18.



ordered (but failed to receive) a set of drawings for the Anglo-American Mark VII heavy before they folded." In 1918, the Whites had some tanks, but made very little use of them against the Reds. By 1919, the Allies had plenty of war surplus for the White armies. More tanks appeared, and were used by White armies in the drive against Petrograd (later Leningrad), and in the South at Kherson, Taganrog, and Tsaritsyn (Stalingrad).

As the Reds began to capture tanks from the Whites, they put them to use—which has caused the Soviets to quip that Winston Churchill (famous for his support of the White armies) is the real father of Soviet tanks. By the end of the Civil Wars, the Reds had picked up between 80 and 100 tanks. The majority were light 6-ton French Renaults, and British Mark V heavies (often called Ricardos by the Soviets, from the name of the engine). There was a sprinkling of light British Whippets. But the number and use of tanks on both sides was extremely limited.

The proudest exploit of these "trophy" Red tanks during the Civil Wars was at Polotskoi, where the Reds were fighting the Poles. Here, on July 4, 1920, some British Mark V heavies supported the 33d Red Infantry Division. With the aid of an armored train, this tank-infantry team cracked the Polish line, claimed 700 prisoners—and what was far more important in those days, 8 artillery pieces and 20 machine guns.

The Red tank-infantry-armored train team was again used down in the Caucasus, in the "liberation" of Tiflis from the Whites, on February 25, 1921. The Reds also used tanks at Volochai. Russian-made Renaults were used in Poland, in the Ukraine, and in the Caucasus.

The term "Russian-made Renaults" actually covers mighty little ground. The Russian-built version of the French 6-ton light tanks was inspired when a captured Renault from the Petrograd front was brought to the Sormovo factory for repair. The factory's engineers and technicians—belonging to what had been a rapidly growing locomotive and railway factory near Bryansk, southwest of Moscow, were anxious to try and build their own tanks. In 1919 the decision to build some copies of the Renault were made. The engine was built by the Moscow shops which later became the AMO plant. The armor came from the Izhora plant—one just south of Petrograd at Kolpino, where the Imperial Navy had made armor, boilers, and ship machinery. The rest was made at Sormovo, where the components were assembled.

On August 31, 1920, the first tank was tested. On the following December 1—over a year from receipt of the production green light, Sormovo declared complete their first copy of a fully engineered French production model. It was a great occasion; Lenin himself was informed by telegram—for the chiefs of the Soviet state have always been vitally interested in the development of Soviet armor. The plan was to build by the next

spring five platoons ("bottle units" the Reds called them) each of three tanks. Within each platoon, two tanks were to be machine-gun armed, and one to have a short 37mm gun.

The story of the production of the Russian Renaults is an important one for Americans. Only two years before the Russian engineers embarked on their project, the U.S. in December, 1917, received a sample French Renault, complete French drawings, and a Renault engineer. Finished tanks started to come through in October, 1918.

But this period wasn't all spent in production work. At first American manufacturers were reluctant to stick their necks out by undertaking to mass produce a tank designed to suit what the Germans call "unrationalized" Old World methods. Of course, the drawings had to be changed from the metric system to feet and inches—but this was a handicap under which the Russians also worked. When contracts were let, time was taken up in engineering production according to American standards. But though the U.S. automotive industry was still comparatively young, and though special facilities for armor production had first to be created, American industry had done 209 Renaults in the time Russia's industry had done one. Without doubt, had the Armistice not intervened, the next three months would have seen a flood of tanks pouring forth from the U.S. plant combine—to complete in a year and a quarter a total of 4,400 Renaults.

The Russian Renault tank program proved a flash in the pan. Though built by experienced shops, upon the Red Army's own admission the Russian Renaults didn't stand up well. Production was suspended after 15 were built, although the tanks saw Civil War service, and continued to be the principal Soviet service tank until 1929.

The degree of comparative achievement on this early tank—the first one either the Soviets or the Americans produced—startlingly reveals the relative standing of U.S. and Soviet industries at that time. It reveals the immense handicaps under which the Soviet



The Russkii Reno.



THE DEFENSE OF TSARITSYN (STALINGRAD).  
From the painting by P. Sokolov-Skalya. Stalin—in long coat—stands in center of scene.

armor program was initiated, and under which it has labored.

More important, it brings into strong relief the matter of quality—the significance of which is too often forgotten in consideration of a weapon's given characteristics, and in the face of impressive figures as to quantity production. The qualitative factor in the performance of the Russian Renaults is highly significant. It was the first twinge of pain presaging the onset of a major headache that has plagued the Soviet tank industry as it has grown and expanded.

The Red Army wasn't sorry to see the Renault flop. This tank (designated, in approved transliteration, *Russkii Reno M 31*) had originated abroad. Its design was not necessarily adapted to Russian terrain conditions, to Red tactical notions, or to Red industrial potentials. Requirements of the Civil Wars called for a tank far more mobile than the 5-mile-an-hour vehicle, however good that tank might have been for pickling along in trench warfare. It is noteworthy that Mr. P's tank, given serious consideration by the old War Ministry, had made all of 15.5 miles an hour. In the highly mobile warfare in which the Reds indulged, where cavalry had again come to the fore, and Budenny's First Mounted Army was the crack force of the Red Army, the Red leaders wanted armor that could roll.

For later armor development, these Civil War experiences were important. They conditioned Red leaders to sweeping envelopments, to hanging flanks, to breakouts from encirclement. The mentality these wars created was far different from the cautious, slugging, pessimistic attitudes developed by Western trench warfare. The Reds became accustomed to taking great risks to win great stakes; they were primed to think of tanks in other terms than that of infantry support, and to accept eagerly the later teaching of Britain's General Fuller.

The *Russkii Reno* was obviously not the tank to suit such minds. Russian industry did strive to increase the *Reno*'s speed, but brought forth the same waddling mouse. The Russian version was only faster than the

French original by a hair—the Russians claiming 5.9 miles an hour against the French 4.9. The American Renaults could do six.

It is therefore understandable that after the Civil Wars, the armored cars continued to outrank the tanks in importance. They had a central administration, a service publication (*The Armored Car*), and a chief with the rank of Corps Commander (the title "Major General" then being taboo). Tanks were few. They were largely restricted to the 3d Tank Regiment. Efforts were devoted to training, for which purpose the French and British tanks were used.

Interest in tank development naturally continued in the postwar period. For reasons that will presently appear, study of the period gives the impression that Russian engineers were more eager for armor progress than the military. Certainly the new Red regime, then anxious to prove the old wrong in every respect, was a sucker for a "let's show we can do it" approach—a thesis that has been well documented by the studies of White and Basseches. Because of its open attitude, the new regime was able to open the floodgates of engineering and military enterprise. Not being an old, well-established service the Red Army command had no inclination to sneer at the proposals of civilians and subordinates. Anxious to better its low estate, it was on the lookout for ideas that would redound to its advantage. It was in the healthy position of an underdog, "have-not" military service. Not unnaturally, it proceeded to usher in an era of remarkable progress in technical and tactical pioneering—much of it regarded during the 1930's as wild and woolly, but later taken over in whole or in part by the major powers.

It is noteworthy that this progress was attributable not to cold calculation, but to a definite psychological situation—one which affected not just armor, but uniforms, insignia, decorations, small arms, and just about every field of military endeavor. This emotional factor in Soviet military developments is one Americans often miss; they are too inclined to think that all technology and science are carried on under conditions of robotic ratiocination.

Actual progress and production were hampered by what the Soviets term the "weak technical base of the reconstruction period." In fact, the year 1923 marked a very low ebb for the Red Army. Demobilization and postwar lassitude had hit it hard, the way the U.S. forces were hit right after World War II. The Reds, rather than the Nazis, looked like the likely winners in Germany's domestic political conflict. Because both the Reds and the Germans were angry with the Western Allies (the Germans because of the provisions of the Versailles Treaty, the Soviets for being cast out of the world community), the Reichswehr (the pre-Hitler army) and the Red Army hummed up.

The camaraderie of the orphans of Versailles was not, however, very cozy. At this time the Germans were themselves recommencing to develop tanks—un-

der cover, of course. The Reds conspired to aid them. Thus it was that the original German 18-ton experimental tanks—batches of five each from Krupp, Daimler-Benz (the motor people), and Rheinmetall (old gun people then also developing the 88's) were delivered in 1928, and sent to Russia to be assembled. They went to a tank school and test center deep in Russia—to Kazan on the Volga bend, over 450 miles due East of Moscow.

Two other types of vehicles were sent out to Kazan for test. There was an unsuccessful track-and-wheel job, and five "Little Tractors" from Krupp and Rheinmetall, each of which tanks ran in weight from 8 to 9 tons, and carried a 35mm gun. Magirus, Daimler-Benz, and Bussig-Mag may also have shipped out their 1927 experimental 7- to 8-ton 8-wheeled reconnaissance cars, one or more of which may have been amphibious.

Unfortunately for the Reds, none of these German tries was any more than a practice shot. While the Germans were fooling around at Kazan, they didn't send out there any armored vehicle models which really interested them. Krupp's 1928 LAS-1 (camouflage name for the Pz. Kpfw. I, standing for "Farm Tractor") stayed home. It was the first tank the Germans selected for production when they gave up their idea of bigger, better-gunned tanks, and went in for masses of small machine-gun armed jobs in the early 1930's. The Russians saw nothing of the MAN (the Diesel people) LAS-2—which, with the Pz. Kpfw. I, comprised the majority of German tanks in the Polish and French blitzes. Anyway, the LAS-2 (later Pz. Kpfw. 2) appeared in 1933, when Hitler's political success in Germany had soured the Reds upon the cooperative scheme, resulting in a German withdrawal from Kazan toward the end of the same year.

Because the German firms mentioned had conspired to keep the big German auto producers like Opel and Cologne-Ford out of the German armor picture (their American tie-ups supposedly would have given away Germany's violation of the Versailles no-tank rule), the Reds failed to get from this deal any firsthand knowledge of up-to-date mass production know-how as applied to tank design and manufacture. Since the Germans had had very little World War I experience with tanks anyway, and since one of their best men (Vollmer) was working with Landeswerk in Sweden (from whom the Russians could buy samples if they cared to), the Germans didn't have so much to teach their Russian neighbors.

So far as mutual development exchanges went, the arrangement was plainly a sterile bargain between two very cagey crooks. The chief value for both seems to have been in the school. Here German officers were in the great majority. Having technically been dismissed from their service, they were in theory attending as tourists. The course ran as long as three years, and—interestingly—used only German vehicles.

As was natural, the Soviets displayed interest in armor from all over. In 1926 they bought a copy of the Fiat 3000 B (an Italian edition of the 6-ton Renault), and a Czech KH 50 tank. The latter had both tracks and wheels, one being raised to permit travel on the other. The Russians never took to this or to the similar German vehicle. Between 1927 and 1929 some 40 British Mark I Medium tanks were purchased from that horrible example of "greedy, war-breeding monopoly capitalism"—the great British Vickers-Armstrong firm.

While paying close attention to foreign developments (how close is apparent from their products) Soviet designers continued from 1925 to 1931 to try out their own ideas. In 1927 they came out with the prototype of the MS-1. (The initials do not stand, as usually reported, for "Little Soviet," but for *Mali Soprovozhdeniya*, which means "Little Accompanying.") This 6-ton infantry-accompanying tank (later redesignated the T-18) mounted in its turret a short 37mm gun. The turret machine gun wasn't coaxially mounted, but was set in a facet of the turret armor to the right of the main armament. The T-18 was a 2-man tank like the earlier Renault, and had for the time fair (.63-in.) armor. The desire for mobility made itself felt in the motor, the power train, and the suspension. To cut down the rear silhouette, the motor was a flat opposed-piston model. Transmission and engine were compactly incorporated in a single housing. The speed was 10.5 miles an hour. The Soviets frankly admit that it was based upon the original Renault, having the latter's hull, turret, and tail. These were features which American industry in World War I had not found to lend themselves to easy mass production.

The T-18's mobility and roadability were better than the Renault's, and in 1928 production was started at the Leningrad Factory that had been renamed Bolshevik. Production continued until 1931. Minor changes were introduced in turret design, in suspension, and in armor. A smoke projector was added, as well as a gas filter. (The Red Army was chemical-defense conscious.)

The T-18 soon got its baptism of fire. It was put to work helping suppress the peasants who had revolted along the Kiev-Voronezh railway. (The peasants, Ukrainians to begin with, had objected to Stalin's program of enforced farm collectivization.) The importance of armor as an internal bolster to the regime had by then been recognized. To secure the loyal support of this arm, in 1924 it had become a requisite that 50% of armored personnel be of proletarian origin—as against 40% for the Air Corps, and 8% for the infantry.

In 1929, when the T-18 began to replace the Russian Renault, it saw further service along the Chinese Eastern Railway. This line ran through Manchuria

\*No new designations for later improvements were provided, contrary to previous belief.

as a short cut to Vladivostok from Central Siberia; the Manchurian war lord Chang Tso-Lin raided and looted its Russian personnel, and later that year he crossed over into the Soviet Union proper. The Reds proceeded to teach him a lesson.

Between 1929 and 1931, Soviet engineers tried out eight types of tank, designed for various purposes. The only one produced—and that in limited numbers—was the T-24. This was a larger infantry-accompanying tank than the T-18, really what in that day was classed as a medium. Like the earlier M1921 U.S. experimental medium, the T-24 had two turrets, one atop the other, and a bow machine gun in the hull. The top turret had but one rifle-caliber machine gun, but the main turret sprouted a cannon and several machine guns. The suspension was a prolongation of the T-18's and used the same coil spring and hydraulic buffer system for mounting the bogies.

The other types of tank just didn't work out right. They vibrated badly, had poor cross-country characteristics, and were hard to drive (a feature still found in the T-24). Plainly, Soviet engineers were up against it. They were disappointed, too, in the work of some German contract engineers. Supposedly automotive specialists (one did the actual work on the special T-18 motor), they do not appear to have turned in a much better performance than their supposedly less-experienced Soviet colleagues.

The chiefs of the reorganized Red Army were not going to stand for this state of affairs. The low condition of Soviet industry might have been tolerated during the 1924-1927 period, when the Red Army was coming out of the post-Civil War doldrums. Then Mikhail Frunze (the actual chief) had on the whole adopted a "nichevo" attitude toward the great technical deficiencies of the Red Army, and toward its weak base in Soviet industry. Though as early as 1924 he had publicly recognized the great need for the development of internal combustion engines for military weapons, he thought that the backwardness of Soviet industry made any rapid progress toward equality with the West impossible. He contented himself with trying to overcome the contempt for Western technical progress which the Civil Wars had bred in the minds of too many Red Army officers. They had to learn that they couldn't afford to pitch into an armored regiment with a squadron of horse supported by Tachanka-mounted Maxims.

But when the Defense Commissariat went in 1927 to Klementi Voroshilov—a crony of Stalin's, and a mean technical hand hailing from Lugansk in the industrial Donets Basin—the whole atmosphere changed. Voroshilov postulated an inevitable war against the Soviet Union. In that war, efficiently operating technical equipment of advanced design was

\*Contemporary reports, which persist today, have it that the Soviets in 1926 built an 80-ton tank. These reports were without foundation, for reasons which will be patent below.

to be of signal importance (and how right he was). Tanks he recognized as a fundamental weapon; upon them he placed the greatest emphasis. To supply such matériel, he demanded more than the substantial munitions industry advocated by some Reds. He wanted a broad economic base to provide for emergency conversions, and to make possible the manufacture of the myriad items the need for which could not necessarily be foreseen at any given stage of technical evolution.

Voroshilov had the greatest scorn for the Soviet industrial plant extant before the First Five-Year Plan began in 1928. He used words like "morass," "chaos," and "eyesore" to describe it. He was qualified to criticize: in his early days in "Russia's Pittsburgh" he hadn't been just an accomplished Red agitator; he had proven that he could put his hand to many technical tasks, and do well at them. It was the more understandable, then, that the poor quality of Soviet output disgusted him. The limited amount of military output alarmed him.

His reactions were justified. The automotive industry in Czarist Russia had been almost non-existent. The first auto plant was the Russo-Balt at Riga, founded in 1908. In World War I another small plant was started—the Puzyrev Works, but this shop and the Russo-Balt plant together didn't assemble more than a few dozen cars before the outbreak of the Revolution in 1917.

During the war a banker named Ryabushinski bought a license to build Italian Fiats for a round million rubles. In spite of an eight million ruble loan from the War Ministry, he made little progress. When the Revolution came, his plant consisted of a series of disconnected, ill-equipped shops—but they included a forge, foundry, and machine shop. After the Revolution, the Reds moved in tools from elsewhere, and used the plant to overhaul the foreign cars and trucks which constituted the bulk of Czarist automotive equipment. This "bulk" wasn't much. The records show that the Soviets inherited less than 10,000 motor vehicles from the old regime.

The Revolution and Civil Wars did no good to what little Russian industry there had been. The machine shops and other plants that had done conversion work and repair of tanks, armored cars, and trucks were concentrated largely in and around Petrograd (Leningrad) and Moscow, and down in the Ukraine. The tide of war that had swept over the latter area hadn't done the facilities there any good. Much of what was left was worn. Back during the war with the Germans the Russo-Balt site had been lost, and the plant hastily evacuated to Petrograd.

The automotive industry base for Soviet armor development was thus practically nonexistent. Initially, not much was done about the automotive lack, either. In 1923, the Soviets did decide to recommence the manufacture of autos. They reorganized the Moscow shops and renamed them AMO. On the 1924 anni-



versary of the November Revolution the first truck made in the Soviet Union (and the first trucks ever made in Russia) rolled off the production line. They were AMO-F-15's—ton-and-a-halfers. In 1926, AMO produced all of 265 vehicles. (France in 1925 built 452,000 cars, 245,000 trucks.) At that, bearings and electrical equipment were imported.

Later, but before the First Five-Year Plan, an auto plant was built at Yaroslavl, well to the northeast of Moscow, and the Spartak Factory in Moscow itself was altered for auto production. The combined output of these Soviet plants was insignificant. In 1928, the total output of cars and trucks for all factories was only 835. The number of motor vehicles in the Soviet Union was then around 18,000—almost all of which were imported.

As for tractors, matters were as bad, if not worse. Blinov's caterpillar tractor enthusiasm was to lie dormant till it was resurrected under the Five-Year Plans. Nothing had really been done about tractors until the Revolution. In 1920-21 factories at the Zapozzhe (formerly the Alexandrovski Steel Works, which had supplied the Nikolaev Shipbuilding Yards), and at Kolmna (a locomotive building plant 72 miles southeast of Moscow) tried building some tractors. In 1920, with automotive help from the Moscow auto combine, the Bolshevik Plant in Leningrad turned out a little tracked prime mover. But the tractor division of the Putilov Plant seems to have produced most of the tractors of the Reconstruction Period. With such facilities, in 1924 the Soviets turned out 33 tractors; in 1927, the output was 937.

It wasn't just the depressing aspects of the Soviet automotive industry that bothered the tank-conscious Voroshilov. Even if Soviet Russia were to create a proper armored force, backed by the proper motor vehicles for transport and supply, she would still need a big automotive fuel industry. She would need a road and rail net better than the potholed tracks, and lines of old iron and wood which the Reds then had.

Under the circumstances, it is easy to see why the Soviets concede that though the Russians "invented" the tank, Czarist Russia could not have been its "Fatherland." It is easy to see why Voroshilov had to do something about motors and armor for an army which in 1928 mustered 29 regular and 42 territorial (National Guard type) infantry divisions, and 12½ regular and 4 territorial cavalry divisions. But it seems presumptuous for Voroshilov to have hoped to create a sizable tank force upon such a base, and to have hoped to accomplish his aim in a few years.

Nevertheless, when the First Five-Year Plan was discussed in 1927, Voroshilov pushed hard for his maximal aims. He put his program across. He got his broad industrial base aim approved. His military aim was sound and foresighted: to maintain the numerical strength of the forces, while bringing up the amount and quality of matériel, and gearing training to the

level of technical requirements. His eventual goal was quantitative and qualitative quality with Western forces in actual matériel, and in the ability of the troops that manned the new equipment.

Under the First Five-Year Plan the automotive industry got a terrific boost. The AMO plant was greatly enlarged—and renamed for Stalin. The Yaroslavl Plant was rebuilt in larger form. In 1931 the Soviets completed negotiations with Ford for a great new plant at Nizni-Novgorod, 250 miles east of Moscow. The plant was named for Molotov, and the city renamed for the poet Gorki. Originally fitted to make Model A Ford trucks, the Molotov Plant was destined to play an important role in the story of Soviet armor.

The light types of vehicles selected for production in the big new auto plants were not deemed to fit these factories for construction of medium and heavy armored vehicles. Moreover, war demands would be heavy for trucks and staff cars, and the added imposition of a heavy combat vehicle program might be more than the auto industry could stand. Since the Soviets badly needed tractors in their program of agricultural expansion, and since tractors presented design, engineering, and production problems more closely analogous to those for tanks, the Soviet selected their still embryo tractor industry as the one to boom for tank and artillery prime-mover potentials. It was to be the industry on which they were to rely for heavy tracked vehicles in peace and war. They felt that, should complete wartime conversion prove necessary, the country could better do without tractors, than without trucks.

Under the Plan, the Putilov Plant—which had made everything from locomotives to artillery and naval armor plate—lost its tractor facilities, which were expanded and made independent. The tremendous new Dzhershinski Factory at Stalingrad was to go in for tracked vehicles. Between Stalingrad and Moscow, at Kharkov, was to be erected another great plant. Finally, at Chelyabinsk, was to be another great factory. Like the ZIS auto plant in Moscow, it was named after Stalin. This plant in the dark days of World War II was to act as a mother hen to the tank-production facilities of the other big tractor factories, as they fled the German advance. It was to become the greatest tank plant in the world.

For guidance in factory methods to be used in these big new auto and tractor plants, the Soviets looked beyond Europe. The slow, "unrationalized" techniques of the Old World couldn't make possible the achievement of Soviet goals within the prescribed time limits. Only the methods developed by the unlimited ambition of American industrialists were good enough for the unlimited ambitions of Soviet leaders. Thus, though Soviet Russia picked her own and foreign brains for what to produce, it was from Americans that she learned how to produce. The Reds' open acknowl-

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delivery—the amount of controlled fire delivered at a critical place at a critical time. Viciousness of battle is measured by the riflemen killed and wounded and not by the numbers missing in action. At the height of the Ardennes offensive, Allied troops were faced with superiority in numbers and fire. It was a hard, bitterly contested battle. In Alsace there was an equally aggressive and determined enemy. In addition to having superiority in numbers and fire, he had the advantage of terrain and observation, short supply lines and a plentiful supply of ammunition. There, also, was a hard, bitterly contested battle.

Applying the comparative measuring rod of battle intensity to the two phases of the Bulge Counter Operations it is interesting to note that from the number of troops involved, the weather, and the terrain, the Alsatian phase equalled if not surpassed the Ardennes phase. Table 1.

As a part of the Alsatian phase of the Ardennes Operations, the 14th Armored Division, undermanned and outgunned, undertook to relieve the remnants of two beleaguered infantry battalions and restore a four-thousand-yard portion of the Corps MLR. Instead of

encountering localized elements of a demonstration force, it ran head on into a major counteroffensive. The cost report for an eight-day period of operations is a fair representation of one phase of the fighting. Considering that the division was being utilized against fortified positions and in restricted terrain, Table 2 illustrates the bitterness of the actions.

According to the myopic views of the historians, the action in Alsace may have been diversionary in nature. If that is true, the expenditure of men, ammunition and equipment to effect the demonstration and the expenditures required to halt it attest that it was the most colossal one ever mounted in the history of war. Certainly the breadth of the front, lack of communications, and conspicuous absence of poetical reportorial agents prevented the development of an epic or saga. Nevertheless, although their perspective may have been blurred by frost on the periscope and snow on the peepsight, the men in the tanks, the men on the ground and the men with the enemy all around them like to think that when they attacked against odds and held against odds, the intent of the enemy was more significant.

## The Story of Soviet Armor

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edgment of their debt to Americans in this sphere, and their feeling that since then both the U.S. and the USSR have left Europe in the lurch as regards production methods, should be an encouragement to Americans. It should especially encourage those who think that recent acquisitions of German talent will give Soviet industry a terrific shot in the arm.

During the 1928-1932 First Five-Year Plan period, schools and courses for tank commanders and drivers were organized. In 1930 the main military staff college created a special department of mechanization and motorization, which cooperated with Moscow's Automotive and Tractor Institute (NATI). Tactical studies were advanced through the creation of experimental tank and armored car units.

Meanwhile, Soviet engineers strove to get the bugs out of what later proved to be many sound tank ideas. But Russian engineering and technical staffs just didn't have the background of European know-how. It certainly had none of the experience passed on to America by the waves of emigration of skilled artisans and engineers from Central Europe. True, through the centuries Europeans had gone to Russia to work, but there had been no mass migrations.

It wasn't that the brains of Soviet engineers weren't fertile, and the technicians capable of skilled work. Their big problem was how to transfer concepts from paper to metal without incorporating bugs that would take ages of trial-and-error testing to remove. It would

seem that for such accomplishments, experience is the best teacher. Certainly Soviet industry—however long on ideas—was very short on that priceless item. It was especially short of it in the automotive and tractor fields.

Meanwhile Klementi Voroshilov was figuratively tapping his foot in the Kremlin. He might not have been fully aware of the value of experience, but anyway he was fully cognizant of the military sensitivity of the Soviet Union in its "T" (for tank) zone. Therefore, at the turn of the decade, Soviet tank engineers were told to stop trying to materialize their dreams. They were instructed to build what dream castles they could upon foreign chassis that would roll reliably. They were to pick modern motors and suspensions developed and proved by foreign engineers and machinists whose background and experience enabled them to take out prototype bugs without endless experimentation.

With that directive there begins a new era in the development of Soviet armor. It is the "Middle Ages" of the 1930's. For Soviet armor it was an era founded upon an industrial base created by the First Five-Year Plan, and producing (with important Soviet modifications and to Soviet tactical concepts) tried and true automotive engineering designs of England and America. It was a period when Soviet pride, suppressed in its mechanical expression because of urgent defense requirements, stung under the stigma of failure. As they nursed their injured feelings, Soviet engineers schemed for the day when they should try a comeback—one they could make hold.